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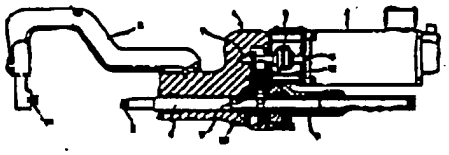
[54]发明名称 便携式铆接枪

[57]摘要

一种使用电动机、不受使用场地限制、不需要特别的密封结构、能容易地调整铆接时的速度、并且制造成本低的便携式铆接枪，其利用固定在枪本体的固定臂前端的冲头支座和能进退的加压杆前端的铆接冲头的配合进行铆接，在枪本体上安装着电动机，该电动机的输出轴通过联轴节连接着传动轴；不能进退的回转板牙具有与设在加压杆外周上的螺纹相啮合的螺纹，在上述的传动轴和回转板牙之间设置着减速装置。



权 利 要 求 书

1 、一种便携式铆接枪，其利用固定在枪本体上的固定臂前端上的冲头支座和能够进退的加压杆前端的铆接冲头的配合进行铆接，其特征在于在上述的枪本体上安装着电动机，电动机的输出轴通过联轴节连接着传动轴；在上述的枪本体上不能进退地配设着回转板牙，回转板牙具有与设在加压杆外周缘上的螺纹相啮合的螺纹；在上述的传动轴和回转板牙之间设置着减速装置。

说　　明　　书

便携式铆接枪

本发明涉及一种铆接枪，特别是涉及一种利用固定在枪本体上的固定臂前端的冲头支座和能够进退的加压杆前端的铆接冲头进行铆接的便携式铆接枪。

以前，利用电动机的铆接枪是公知的，例如日本专利公报特开昭63－199086号或实用新型公报实开平4－471号所公开的那样，而这种便携式铆接枪，如日本专利公报特开昭57－102772号所公开的那样，都是利用液压缸或气缸来驱动加压杆的。

由于在便携式铆接枪的现有技术中一般都利用液压缸或气缸，因而存在下列几个问题。

（1）因为除了作为动力的电源外，还需要油、空气等，所以使用场所受限制。

（2）因为需要用严格的密封结构来克服油的泄漏和空气的泄漏，所以铆接枪的价格昂贵。

（3）铆接时的速度难以调整，因而常出现损伤加工材料的问题。

本发明就是为了解决上述的现有技术存在的问题而作出的。其目的是提供一种通过利用电动机以确保少受场地限制、不需要严格的密封结构、能容易地调整铆接时的速度、制造成本低的便携式铆接枪。

为了达到上述的目的，本发明所作出的便携式铆接枪是利用固定在枪本体上的固定臂前端的冲头支座和能够进退的加压杆前端的铆接冲头的配合进行铆接的，其特征在于在枪的本体上安装着电动机，电动机的输出轴

通过联轴节连接着传动轴；在上述的枪本体上不能进退地配设着回转板牙，这个回转板牙具有与设在加压杆外周缘上的螺纹相啮合的螺纹；在上述传动轴和回转板牙之间设置着减速装置。

当把要铆接的构件放在冲头支座一侧上并驱动电动机时，电动机输出轴的回转就由传动轴经减速后使回转板牙回转，该回转板牙的回转使加压杆前进而与要铆接的构件相顶靠，通过使加压杆进一步前进，从而在冲头和冲头支座的配合下完成铆接作业。由于驱动电动机的动力只是电源，不使用液压缸或气缸，因而没有密封机构，而且通过电动机的回转控制就能很容易地调整加压杆移动的速度。

以下配合附图对本发明进行详细描述。

图1 是本发明的便携式铆接枪的侧向局部剖面图；

图2 是本发明的便携式铆接枪的铆接部分的剖面图；

图3 是铆接完成状态下的剖面图。

下面，参照着图1 －图3 对本发明的实施例进行说明。

图中，1 是铆接枪本体，在该本体1 上安装着电动机2 ，还设置有固定臂3 和可进退地加压杆4 。

在上述的电动机2 的输出轴5 的前端上安装着联轴节6 ，在该联轴节6 的另一侧上连接着传动轴7 。而且在上述的加压杆4 的前端上紧固有铆接冲头8 ，在这加压杆4 的中间部位的外周缘上设有螺纹9 。１０是套在加压杆4 的外周缘外侧上、相对于枪本体1 不能进退地设置的回转板牙，在回转板牙的内部设有可与上述的螺纹9 相啮合的螺纹１１，该回转板牙１０和传动轴7 之间设置着由齿轮组构成的减速装置１２。另外，在上述

固定臂3 的前端与上述铆接冲头8 相对着的位置上安装着冲头支座1 4 ，冲头支座1 4 具有冲头支座用的凹部1 3 。

而且，在上述的铆接冲头8 的外周的位置上、限制件1 7 的内部配设着套筒1 6 ，套筒1 6 受弹簧1 5 的作用而被朝前方地顶靠着。在上述的冲头支座1 4 的外周位置上、限制件2 0 的内部也配设着受弹簧1 8 的作用而朝前顶靠着的套筒1 9 。

由上述的结构构成的便携式铆接枪，当由图1 所示的状态转变成图2 所示的状态时，要铆接的构件A 、B 合在一起并与冲头支座1 4 的凹部1 3 相靠。使电动机2 的输出轴5 转动，输出轴5 的回转就会通过联轴节6 传递给传动轴7 ，并经过由齿轮组构成的减速装置1 2 减速，使回转板牙1 0 在加压杆4 的外周上回转。由于回转板牙1 0 内周缘上的螺纹1 1 和加压杆4 外周缘上的螺纹9 的相互啮合，加之回转板牙1 0 是相对于枪本体1 不能进退地配设着的，因而回转板牙1 0 的回转就使加压杆4 前进。

当由于加压杆4 的前进使铆接冲头8 和套筒1 6 的前端与要铆接的构件A 、B 的一侧相接时，调节电动机2 的回转速度使之减慢。通过使转矩增加，加压杆4 的运动状态变为慢慢地以较大的压力前进。而此时，套筒1 6 在与要铆接的构件A 、B 的一侧面相紧靠的状态下，克服弹簧1 5 的弹力而被压向限制件1 7 内，故只有铆接冲头前进。而在冲头支座1 4 一侧，套筒1 9 在与要铆接的构件A 、B 的另一侧相接的状态下，克服弹簧1 8 的弹力而同样被压向限制件2 0 内，从而形成套筒1 9 的前表面和冲头支座1 4 的前表面处于同一平面的状

态。然后，上述的铆接冲头8 继续前进，使与这冲头8 相接一侧的那部分构件A、B 受到较强的压力，与这受压部分相反的一侧则被压入上述的冲头支座1 4 的凹部里，从而使构件A、B 如图3 所示地那样被铆接在一起。

接着，当上述的铆接结束时，通过使电动机2 的回转方向改换成相反的方向并快速地回转，使加压杆4 快速后退，从而使铆接冲头8 与构件A、B 脱离，由弹簧1 5 的作用使套筒1 6 前进，从而使冲头8 缩回套筒1 6 内，同时由于弹簧1 8 对冲头支座1 4 一侧的套筒1 9 的顶推，使构件A、B 的铆接部分很容易地从凹部退出来。

本发明的便携式铆接枪由于利用电动机控制加压杆的进退，因而驱动电动机的动力源只是电源，使其能少受使用场地的限制。另外，由于本发明的便携式铆接枪不使用液压缸或气缸，因而就不需要特别的密封机构；又因为通过电动机的回转控制就能改变加压杆的移动速度，所以能极容易地进行调整；而且由于能容易地获得适宜于铆接的加压力，因而对铆接构件损伤少。故本发明的铆接枪具有价格便宜、性能优越的特点。

说 明 书 附 图

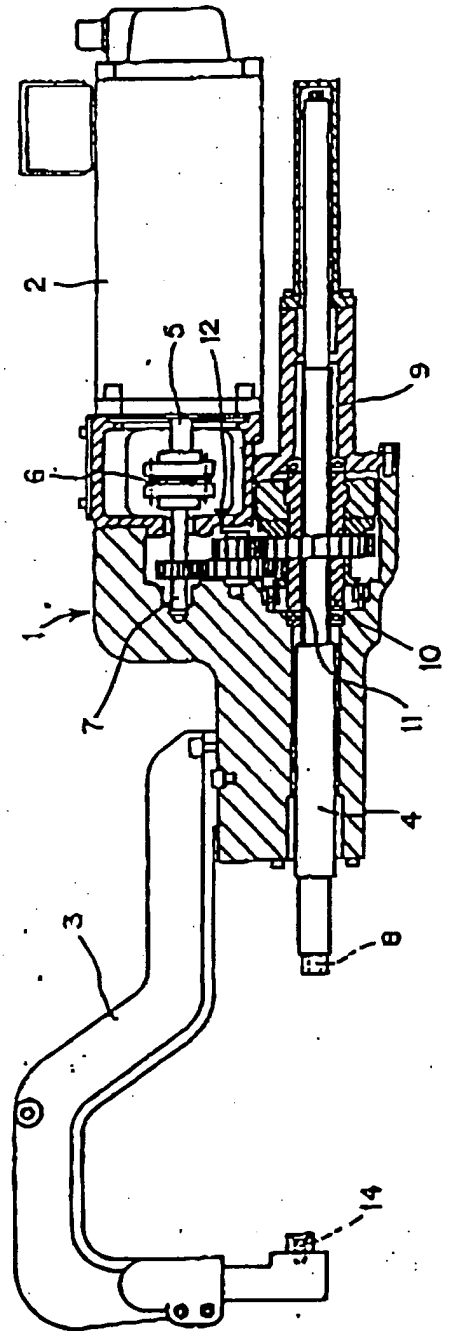


图 1

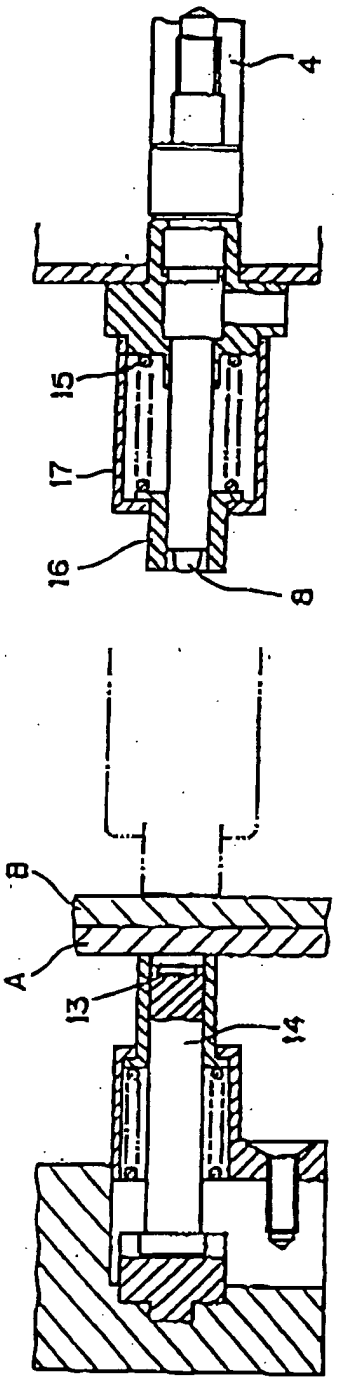


图2

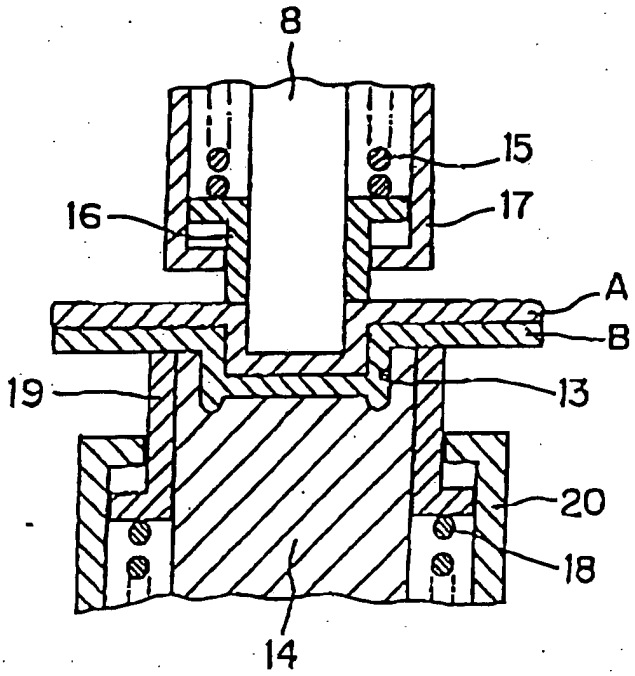


图3

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[Translation from Chinese]

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[74] Patent Agency: NTD Patent and Trademark Agency, Limited
Representative: Shao Wei

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[54] Title of invention: Portable rivet gun

[57] Abstract

A portable rivet gun using an electric motor, which can be used in a wide range of places, not requiring a special sealed structure, with a speed that can easily be adjusted during riveting and having a low manufacturing cost. It makes use of a ram support seat on the front end of a stationary arm fixed to the body of the gun in conjunction with a rivet ram on the front end of a forward and backward movable forcing rod to facilitate riveting. An electric motor is installed in the body of the gun. The output shaft of the electric motor is connected through a coupling to a drive shaft. A rotating screw plate that cannot move backward and forward has threads meshing with the threads provided on the circumference of the forcing rod. A speed reduction means is provided between said drive shaft and rotating screw plate. [Figure]

Claims

1. Portable rivet gun, using a ram support seat on the front end of a stationary arm fixed to the body of the gun in conjunction with a rivet ram on the front end of a forward and backward movable forcing rod to carry out riveting, characterized in that an electric motor is installed in the body of the gun, the output shaft of the electric motor being connected through a coupling to a drive shaft and there being mounted on said gun body a rotating screw plate such that it can move neither forward nor backward, the rotating screw plate having threads that mesh with the threads that are provided on the circumference of the forcing rod and a speed reduction means being provided between said drive shaft and rotating screw plate.

Description

Portable Rivet Gun

The present invention relates to a type of rivet gun. In particular, it concerns a portable rivet gun that uses a ram support seat on the front end of a stationary arm fixed to the body of the gun and a rivet ram on the front end of a forward and backward movable forcing rod to facilitate riveting.

Rivet guns that use electric motors have been known in the art, e.g. as disclosed in Japanese Patent Gazette Publication No. (1988) 199086 or new Utility Model Publication No. (1992) 471. However, this type of portable rivet gun, like the one disclosed in Patent Gazette Publication No. (1982) 102772, uses a hydraulic cylinder or air cylinder to drive the forcing rod.

In the current art of portable rivet guns, the guns generally use a hydraulic cylinder or air cylinder, and thus they have the following problems:

(1) In addition to requiring an electrical power supply for motive power, they require oil and air, thus limiting the places where they can be used.

(2) Because they require a totally sealed structure to overcome oil leakage and air leakage, rivet guns are high-priced.

(3) It is difficult to adjust speed while riveting. Thus, the material that is being worked often is damaged.

The aim of the present invention is to solve the aforementioned problems with the existing technology. The object is to provide a portable rivet gun which (because it has an electric motor) can be used in a wider range of places, does not need a totally sealed structure, allows for convenient speed adjustment while riveting, and has a low manufacturing cost.

In order to achieve the aforementioned objects, the portable rivet gun of the present invention makes use of a ram support seat on the front end of a stationary arm fixed to the body of the gun in conjunction with a rivet ram on the front end of a forward and backward movable forcing rod to facilitate riveting. It is characterized by the fact that an electric motor is installed in the body of the gun. The output shaft of the electric motor is connected through a coupling to a drive shaft. A rotating screw plate is mounted on said gun body in such a manner that it cannot move forward and backward. The rotating screw plate has threads that mesh with the threads that are provided on the circumference of the forcing rod. A speed reduction means is provided between said drive shaft and rotating screw plate.

When the structural piece to be riveted is placed to one side of the ram support seat and the electric motor is powered, the rotation of the electric motor output shaft is first slowed by the drive shaft and then causes the rotating screw plate to rotate. The rotation of said rotating screw plate causes the forcing rod to advance and push up against the structural piece to be riveted. The riveting operation is completed by causing the forcing rod to advance a step further and then effecting a combined operation of the ram and the ram support seat.

The only motive power used for driving the electric motor is electricity. Thus, there is no need for a sealed structure since no hydraulic cylinder or air cylinder is used. Moreover, one can easily adjust the speed of the movement of the forcing rod by controlling the rotation of the electric motor.

The following attached drawings provide a detailed description of the present invention.

FIG. 1 is a cross-sectional partial side view of the portable rivet gun of the present invention.

FIG. 2 is a cross-sectional view of the riveting part of the portable rivet gun of the present invention.

FIG. 3 is a cross-sectional view at completion of riveting.

An explanation of an embodiment of the present invention now follows, with reference to FIGS. 1 through 3.

In the figures, **1** is the rivet gun body. Mounted on said body **1** are an electric motor **2**, a stationary arm **3**, and a backward and forward movable forcing rod **4**.

Mounted on the front end of output shaft **5** of electric motor **2** is a coupling **6**. A drive shaft **7** is connected to the other side of coupling **6**. In addition, rivet ram **8** is firmly secured to the front end of forcing rod **4**. Screw threads **9** are on the circumference of the middle portion of forcing rod **4**. **10** is a rotating screw plate which fits around the outer edge of forcing rod **4** and which, relative to gun body **1**, is mounted such that it cannot move back and forth. Said rotating screw plate is internally provided with screw threads **11** that can mesh with screw

threads **9**. Speed reduction means **12**, of gear assembly construction, is provided between said rotating screw plate **10** and drive shaft **7**. In addition, ram support seat **14** is mounted on the front end of stationary arm **3** at a position opposite to rivet ram **8**. Ram support seat **14** has recess **13** used by the ram support seat.

In addition, at a position on the outside of rivet ram **8**, limiting piece **17** is internally provided with bushing **16**. Bushing **16** is acted upon by spring **15** and is pushed forward until it rests against the end. At a position on the outside of ram support seat **14**, limiting piece **20** is also internally provided with forward-pushed bushing **19** that is acted upon by spring **18** until it rests against the end.

When the portable rivet gun constructed from the aforementioned components changes from the state shown in FIG.1 to the state shown in FIG. 2, the structural pieces, A and B, that are to be riveted combine and rest against recess **13** of ram support seat **14**, causing output shaft **5** of electric motor **2** to rotate. The rotation of output shaft **5** is transmitted through coupling **6** to drive shaft **7**, and its speed is reduced as it passes through speed reduction means **12**, which is constructed from a gear assembly, causing rotating screw plate **10** to rotate on the outside of forcing rod **4**. Because threads **11** on the inner circumference of rotating screw plate **10** and threads **9** on the outer circumference of forcing rod **4** mutually engage, and because rotating screw plate **10** is mounted such that it cannot move forward and backward relative gun body **1**, the rotation of rotating screw plate **10** causes forcing rod **4** to advance.

When the forward movement of forcing rod **4** causes the front end of rivet ram **8** and bushing **16** to connect with one side of structural pieces A and B, adjustment of the rotation speed of electric motor **2** causes them to reduce speed. By increasing torque, the motion of forcing rod **4** changes such that it slowly advances with great pressure. At this time, bushing **16**, lying snugly against one side of structural pieces A and B that are to be riveted, overcomes the resilience of spring **15** and is pressed into limiting piece **17**. Therefore, only the rivet ram advances. And on one side of ram support seat **14**, with bushing **19** connected to the other side of structural pieces A and B that are to be riveted, the resilience of spring **18** is overcome, and it, likewise, is pressed into limiting piece **20**, therefore causing the front surface of bushing **19** and the front surface of ram support seat **14** to be on the same plane. Then, rivet ram **8** continues to advance, subjecting structural pieces A and B to greater pressure where they connect to one side of ram **8**. The side opposite to the part that is under pressure is pressed into the recess of ram support seat **14**, thereby causing structural pieces A and B to be riveted, as shown in FIG. 3.

When the aforementioned riveting ends, forcing rod **4** is quickly withdrawn by means of reversing the rotation of electric motor **2** and by quickly rotating. Rivet ram **8** and structural pieces A and B are thereby caused to separate. The action of spring **15** advances bushing **16**, thereby causing ram **8** to retract into bushing **16**. At the same time, because spring **18** is pushing against bushing **19** on the side of ram support seat **14**, the riveted parts of structural pieces A and B easily withdraw from the recess.

Because the portable rivet gun of the present invention makes use of an electric motor to control the forward and backward movement of the forcing rod, the only motive power source for driving the electric motor is electricity, which allows for use in a wider range of places. In addition, the portable rivet gun of the present invention does not use a hydraulic cylinder or an air cylinder, and it thus does not require a special seal structure. And because the speed at which the forcing rod moves can be changed by controlling the rotation of the electric motor, it can be easily adjusted. Moreover, less damage is done to the rivet structural pieces because the appropriate rivet pressure can be easily attained. Thus, the rivet gun of the present invention has the characteristics of low price and superior performance.

Drawings Attached to Description

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The following attached drawings provide a detailed description of the present invention.

FIG. 1 is a cross-sectional partial side view of the portable rivet gun of the present invention.

FIG. 2 is a cross-sectional view of the riveting part of the portable rivet gun of the present invention.

FIG. 3 is a cross-sectional view at completion of riveting.

An explanation of an embodiment of the present invention now follows, with reference to FIGS. 1 through 3.

In the figures, **1** is the rivet gun body. Mounted on said body **1** are an electric motor **2**, a stationary arm **3**, and a backward and forward movable forcing rod **4**.

Mounted on the front end of output shaft **5** of electric motor **2** is a coupling **6**. A drive shaft **7** is connected to the other side of coupling **6**. In addition, rivet ram **8** is firmly secured to the front end of forcing rod **4**. Screw threads **9** are on the circumference of the middle portion of forcing rod **4**. **10** is a rotating screw plate which fits around the outer edge of forcing rod **4** and which, relative to gun body **1**, is mounted such that it cannot move back and forth. Said rotating screw plate is internally provided with screw threads **11** that can mesh with screw

threads **9**. Speed reduction means **12**, of gear assembly construction, is provided between said rotating screw plate **10** and drive shaft **7**. In addition, ram support seat **14** is mounted on the front end of stationary arm **3** at a position opposite to rivet ram **8**. Ram support seat **14** has recess **13** used by the ram support seat.

In addition, at a position on the outside of rivet ram **8**, limiting piece **17** is internally provided with bushing **16**. Bushing **16** is acted upon by spring **15** and is pushed forward until it rests against the end. At a position on the outside of ram support seat **14**, limiting piece **20** is also internally provided with forward-pushed bushing **19** that is acted upon by spring **18** until it rests against the end.

When the portable rivet gun constructed from the aforementioned components changes from the state shown in FIG.1 to the state shown in FIG. 2, the structural pieces, A and B, that are to be riveted combine and rest against recess **13** of ram support seat **14**, causing output shaft **5** of electric motor **2** to rotate. The rotation of output shaft **5** is transmitted through coupling **6** to drive shaft **7**, and its speed is reduced as it passes through speed reduction means **12**, which is constructed from a gear assembly, causing rotating screw plate **10** to rotate on the outside of forcing rod **4**. Because threads **11** on the inner circumference of rotating screw plate **10** and threads **9** on the outer circumference of forcing rod **4** mutually engage, and because rotating screw plate **10** is mounted such that it cannot move forward and backward relative gun body **1**, the rotation of rotating screw plate **10** causes forcing rod **4** to advance.

When the forward movement of forcing rod **4** causes the front end of rivet ram **8** and bushing **16** to connect with one side of structural pieces A and B, adjustment of the rotation speed of electric motor **2** causes them to reduce speed. By increasing torque, the motion of forcing rod **4** changes such that it slowly advances with great pressure. At this time, bushing **16**, lying snugly against one side of structural pieces A and B that are to be riveted, overcomes the resilience of spring **15** and is pressed into limiting piece **17**. Therefore, only the rivet ram advances. And on one side of ram support seat **14**, with bushing **19** connected to the other side of structural pieces A and B that are to be riveted, the resilience of spring **18** is overcome, and it, likewise, is pressed into limiting piece **20**, therefore causing the front surface of bushing **19** and the front surface of ram support seat **14** to be on the same plane. Then, rivet ram **8** continues to advance, subjecting structural pieces A and B to greater pressure where they connect to one side of ram **8**. The side opposite to the part that is under pressure is pressed into the recess of ram support seat **14**, thereby causing structural pieces A and B to be riveted, as shown in FIG. 3.

When the aforementioned riveting ends, forcing rod **4** is quickly withdrawn by means of reversing the rotation of electric motor **2** and by quickly rotating. Rivet ram **8** and structural pieces A and B are thereby caused to separate. The action of spring **15** advances bushing **16**, thereby causing ram **8** to retract into bushing **16**. At the same time, because spring **18** is pushing against bushing **19** on the side of ram support seat **14**, the riveted parts of structural pieces A and B easily withdraw from the recess.

Because the portable rivet gun of the present invention makes use of an electric motor to control the forward and backward movement of the forcing rod, the only motive power source for driving the electric motor is electricity, which allows for use in a wider range of places. In addition, the portable rivet gun of the present invention does not use a hydraulic cylinder or an air cylinder, and it thus does not require a special seal structure. And because the speed at which the forcing rod moves can be changed by controlling the rotation of the electric motor, it can be easily adjusted. Moreover, less damage is done to the rivet structural pieces because the appropriate rivet pressure can be easily attained. Thus, the rivet gun of the present invention has the characteristics of low price and superior performance.

Drawings Attached to Description